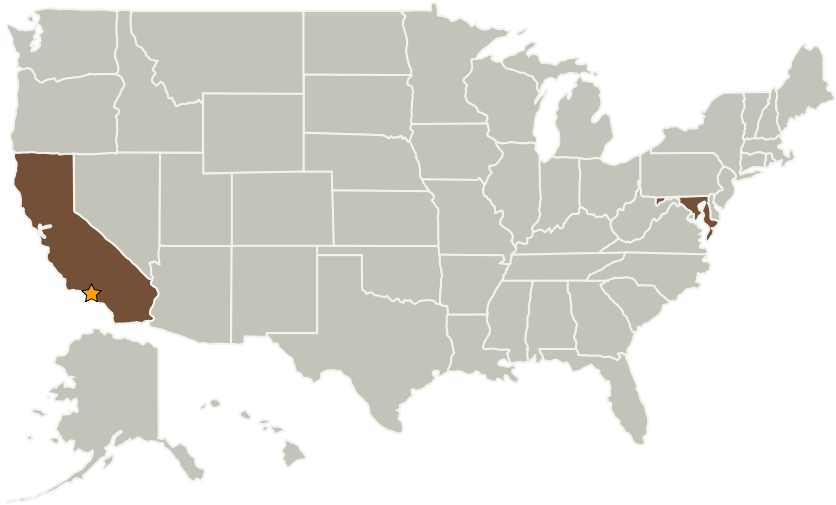
AlN 3D Thermal Packaging, Phase I

Completed Technology Project (2003 - 2003)

Project Introduction

This proposal addresses the need for compact, lightweight packaging to cool high heat producing electronics. Technology Assessment & Transfer, Inc. (TA&T) proposes to develop three dimensional (3D) packages consisting of stacked AlN substrates with integral microstructured flow-through heat exchangers. Of the packaging materials in common use today, AlN offers the best coefficient of thermal expansion (CTE) match to Si and SiC semiconductor chips. By incorporating the primary heat removal functionality into the electrically-insulating ceramic substrate, this packaging approach eliminates the need for separate baseplates and heatsinks made of materials with dissimilar thermal expansion. In Phase I, advanced microstructured heat exchangers will be designed and fabricated. Heat transfer testing will verify analytical and computational predictions. Based on these results, specific NASA electronic module applications will be identified that demonstrate the benefits of this 3D packaging approach. Phase II will focus on designing/fabricating and testing power module designs based on the Cold Cube thermal packaging configuration. NASA applications include thermal packaging for high power microwave transmitters, power conditioning devices and high density avionics and MEMs packaging.

Primary U.S. Work Locations and Key Partners



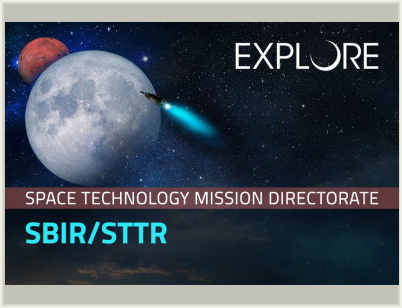


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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Technology Assessment & Transfer, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Annapolis, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Celestino Jun Rosca

Principal Investigator:
Walter R Zimbeck

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.2 Electronic Packaging and Implementations